

REMARKS

Claims 1-20 are pending in the application.

Applicant and the undersigned attorney have carefully considered the Office Action of April 23, 2003. Applicant thanks the Examiner for his time and effort in preparing the Office Action and for reviewing this Response. Claims 1-20 are pending and remain for consideration. No additional fee for claims is due.

Right to Patent Claims 1-20 Over Provan, Wingfield, Allred and Nakajima

Claims 1, 3, 9-12, and 14-15, were rejected in paragraph 1 of the Office Action under 35 U.S.C. § 102(e), as anticipated by Provan et al., (U.S. Patent No. 6,208,955); claims 2 and 13 were rejected in paragraph 4 of the Office Action under 35 U.S.C. § 103(a) as being unpatentable over Provan et al., in view of Wingfield (Wingfield, S. L.; Venema, T. L.; *Aerospace and Electronics Conference*, 1994, NAECON 1994. Proceedings of the IEEE 1994 National, 23-27 May 1994, Pages 1200-1207 Vol. 2); claims 4-7 and 16-20 were rejected in paragraph 5 of the Office Action under 35 U.S.C. § 103(a) as being unpatentable over Provan et al., in view of Wingfield, further in view of Allred (Allred, L. G., *Aerospace and Electronics Conference*, 1990, NAECON 1990, Proceedings of the IEEE 1990 National, 21-25 May 1990, Pages 359-361 Vol. 1), and claim 8 was rejected in paragraph 6 of the Office Action under 35 U.S.C. § 103(a) as being unpatentable over Provan et al., in view of Wingfield, further in view of Allred, and still further in view of Nakajima (U.S. Patent No. 6,411, 945).

The abstract of Provan characterizes the invention (in Provan) as "integrat[ing] two elements" - a graphical user interface, and an inference system that acts as a *diagnostic tool* to permit the *diagnosis of faulty* sub-systems." (Emphasis supplied). In fact, the abstract expressly

states that a report of the *diagnosis* "may be relayed to remotely located *maintenance* crews *to minimize repair time*." (Emphasis added). It is obvious that the system as disclosed by Provan must both exist and be operational if it is amenable to maintenance and repair. Applicant's invention on the other hand, relates to a prospective system used at the conceptualization and design stage, instead of at a maintenance and repair stage, to evaluate multiple virtual and dynamic models instead of evaluating possible future models of a single actual device.

Applicant submits that the Provan patent teaches and suggests the development of a model to simulate the operational behavior of an *actual* device or system under *normal* conditions and the extension of the model to provide possible *failure modes* of this *actual* system by investigating *and combining* the various *known failure modes* of each *actual* sub-system comprising the *actual* system. (Provan, Col. 3, Lines 35 - 51). The *failure modes* constitute deviations from the *normal* (known) behavior of the system. It follows that Provan's system must be predefined and configurationally 'static' with a known or "normal" behavior. Any deviation from this "normal" behavior is considered a potential failure mode to be rectified by repair or replacement of the faulty sub-system so as to return the system back to its "normal" behavior but without altering the original configuration of the system. (Provan, Col. 6, Lines 27-31). In fact, Provan teaches away from making any changes to the as-designed, original configuration of an existing system because Provan considers it advantageous to eliminate "the need to model general functional characteristics not related to diagnostics" from the "primitives" that comprise the building blocks of the diagnostic system disclosed in Provan. (Provan, Col. 7, Lines 1-10).

With respect to claims 1-20 of the Application, the fact that both the present invention and Provan have causal networks, or that Provan discloses a system that appears to embody some

of the components that are disclosed by the Applicant is an inadequate ground for rejection of the claimed invention. Claims 1, 16, 17, 18, 19 and 20 of the Application include *creating* a virtual representation of a weapon system from analysis models whose parameters are selectively filled. In other words, the causal network comprised of the analysis models is a tool for creating a model of a weapon system that, except to the extent of the selected arguments, does not exist until the analysis models are run. Claims 1, 16, 17, 18 and 19 also include a virtual simulation system to *simulate* a weapon system, i.e., test the model's *anticipated* performance. The apparatus in Provan does not test the ideal performance of a model created by the apparatus itself; rather as indicated above, it is a monitoring apparatus, monitoring the operational behavior of an actual device or system. Simply put, the present invention is a prospective system used at the conceptualization and design stage to evaluate virtual and dynamic models, whereas Provan is a retroactive '*diagnostic*' system used to detect faults in existing fixed and static real world systems, such as for example, the preconfigured avionics system in relation to which the invention in Provan is expressly disclosed. (Provan, Col. 5, Lines 17-21).

It is respectfully submitted that Provan neither anticipates nor teaches or suggests the invention as claimed by Applicant in claims 1-20.

With respect to claims 2 and 13, claims 2 and 13 stand rejected in paragraph 4 of the Office Action under 35 U.S.C. § 103(a) as being "unpatentable over Provan et al., in view of Wingfield." According to the Examiner, "it would have been obvious to a person of ordinary skill in the art to modify the weapon evaluation and simulation system described in Provan in the light of the teachings of Wingfield." There is nothing in Provan or Wingfield to support the above assertion. First, in the casual network system model of Provan, "complex systems are described as a number of interconnected sub-systems and each sub-system is viewed as an interconnected

set of primitives." (Provan, Col. 10, Lines 62 - 66). "Libraries provide *behavioral equations* describing the various primitives. . . . Compound objects can be built from the available primitive objects." (Provan, Col. 6, Lines 55 - 59). (Emphasis supplied). In order to modify the diagnostic system disclosed in Provan, in the light of Wingfield as posited by the Examiner, the simulated operational environment alluded to by the Examiner would have to be either built from the available primitive objects of Provan or a new set of primitives would have to be constructed to represent Wingfield's simulated operational environment and these new primitives would have to be compatible with the primitives of Provan. As described above, behavioral *equations* describe the various primitives of Provan. But Wingfield teaches away from the development or use of behavioral *equations* because Wingfield neither discloses nor teaches equations of any kind. Provan, on the other hand, references behavioral equations but does not teach the formulation of such equations. Instead, "libraries provide behavioral equations describing the various primitives" (Provan, Col. 6, Lines 55 - 59). Wingfield does not disclose or teach the 'primitives' required to construct the system of Provan and more importantly, Wingfield does not disclose a library of primitives or provide behavioral equations to simulate the operational environment referenced by the Examiner. Therefore, a person of ordinary skill in the art will not be motivated to modify Provan in light of the teachings of Wingfield in the manner postulated by the Examiner.

For the reasons stated above for claims 1-15 and claims 2 and 13 of the present invention are distinguishable over Provan and Provan in view of Wingfield.

In paragraph 5 of the Office Action, Examiner rejects claims 4-7 and 16-20 under 35 U.S.C. § 103(a) as being unpatentable over Provan et al., in view of Wingfield, further in view of Allred. As discussed above, there is no motivation for a person of ordinary skill in the art to

modify Provan in the light of the teachings of Wingfield as suggested by the Examiner. As discussed above, Provan teaches the development of a model based on "behavioral equations" that represent the subsystems and components of the system. (Provan, Col. 6, Lines 55 - 59). Allred teaches the solution of a *particular* system of equations and unless the behavioral equations of Provan can be exactly represented and manipulated in the manner described in Allred, Provan cannot be combined with Allred. However, neither Provan nor Allred teach or suggest the formulation and representation of the behavioral equations of Provan in the form of a system of equations corresponding to equation numbers (7), (8), (9), (10), (11), (12) or (13) of Allred. (Allred, page 360). Therefore, a person of ordinary skill in the art would not be able to modify the system in Provan in the light of the teachings of Wingfield and further in light of the teachings of Allred.

For the reasons stated above, claims 1-20 are distinguishable over Provan et al., in view of Wingfield, and further in view of Allred.

In paragraph 6 of the Office Action, Examiner rejects claim 8 under 35 U.S.C. § 103(a) as being unpatentable over Provan et al., in view of Wingfield, further in view of Allred, and still further in view of Nakajima (U.S. Patent No. 6,411, 945). For the reasons stated in connection with the rejection of paragraphs 1 thru 5, claim 8 is distinguishable over Provan et al., in view of Wingfield, further in view of Allred, and therefore still further in view of Nakajima. As discussed above, Provan teaches the development of a system based on "behavioral equations" that represent operational behavior of primitives that comprise the subsystems and components of the system. (Provan, Col. 6, Lines 55 - 59). The system is then used to model the normal and faulty behavior of the system. However, there is no suggestion or teaching in Provan that the behavioral equations that define the behavior of the primitives in Provan can be formulated in the

form of a system of equations represented by equation numbers (12) and (13) of Nakajima. (Nakajima, Col. 19, Lines 5-15). Neither does Nakajima teach how discrete behavioral equations describing the behavior of primitives in Provan can be represented and solved in the manner taught by Nakajima. (Nakajima, Col. 22, Lines 20-30).

A person of ordinary skill in the art would not be motivated to modify Provan in view of Wingfield, further in view of Allred, and therefore still further in view of Nakajima. Therefore, claim 8 is distinguishable over Provan et al., in view of Wingfield, and further in view of Allred and still further in view of Nakajima.

In view of the foregoing, it is submitted that this application is in condition for allowance. Favorable consideration and prompt allowance of the application are respectfully requested.

The Examiner is invited to telephone the undersigned if the Examiner believes it would be useful to advance prosecution.

Respectfully submitted,

A handwritten signature in black ink, appearing to read 'BRAD PEDERSEN', with a long horizontal flourish extending to the right.

Brad Pedersen
Registration No. 32,432

Customer No. 24113
Patterson, Thunte, Skaar & Christensen, P.A.
4800 IDS Center
80 South 8th Street
Minneapolis, Minnesota 55402-2100
Telephone: (612) 349-5774